

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 105055-WO	<b>FOR FURTHER ACTION</b>	See item 4 below
International application No. PCT/JP2005/005047	International filing date ( <i>day/month/year</i> ) 15 March 2005 (15.03.2005)	Priority date ( <i>day/month/year</i> ) 16 March 2004 (16.03.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant SUMITOMO ELECTRIC INDUSTRIES, LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input checked="" type="checkbox"/> | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input checked="" type="checkbox"/> | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p>	<p>Date of issuance of this report 19 September 2006 (19.09.2006)</p> <p>Authorized officer  Yoshiko Kuwahara</p> <p>e-mail: pt07@wipo.int</p>
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From the INTERNATIONAL BUREAU

**PCT**

NOTIFICATION OF TRANSMITTAL  
OF COPIES OF TRANSLATION  
OF THE INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY  
(CHAPTER I OR CHAPTER II  
OF THE PATENT COOPERATION TREATY)  
(PCT Rules 44bis.3(c) and 72.2)

To:

NAITO, Teruo  
Shin-ei Patent Office  
7-13, Nishi-Shimbashi 1-chome  
Minato-ku, Tokyo 105-0003  
JAPON



Date of mailing (day/month/year) 23 November 2006 (23.11.2006)	
Applicant's or agent's file reference 105055-WO	203799
International application No. PCT/JP2005/005047	IMPORTANT NOTIFICATION
Applicant	International filing date (day/month/year) 15 March 2005 (15.03.2005)
SUMITOMO ELECTRIC INDUSTRIES, LTD. et al	

## 1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

## 2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

## 3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

Yoshiko Kuwahara

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# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 105055-WO	<b>FOR FURTHER ACTION</b>	See item 4 below
International application No. PCT/JP2005/005047	International filing date ( <i>day/month/year</i> ) 15 March 2005 (15.03.2005)	Priority date ( <i>day/month/year</i> ) 16 March 2004 (16.03.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant SUMITOMO ELECTRIC INDUSTRIES, LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input checked="" type="checkbox"/> | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input checked="" type="checkbox"/> | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis*.2).

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p>	<p>Date of issuance of this report 14 November 2006 (14.11.2006)</p> <p>Authorized officer  Yoshiko Kuwahara</p> <p>e-mail: pt07@wipo.int</p>
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# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

TRANSLATION

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year)	<b>07.06.2005</b>
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Applicant's or agent's file reference <b>105055-WO</b>	FOR FURTHER ACTION See paragraph 2 below
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International application No. <b>PCT/JP2005/005047</b>	International filing date (day/month/year) <b>15.03.2005</b>	Priority date (day/month/year) <b>16.03.2004</b>
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International Patent Classification (IPC) or both national classification and IPC <b>G02B6/00, F21V8/00</b>
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Applicant <b>SUMITOMO ELECTRIC INDUSTRIES, LTD.</b>
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1. This opinion contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the opinion
<input checked="" type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input checked="" type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Authorized officer
Facsimile No.	Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

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Box No. I	Basis of this opinion
1.	<p>With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.</p> <p><input type="checkbox"/> This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).</p>
2.	<p>With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:</p> <p>a. type of material</p> <p><input type="checkbox"/> a sequence listing</p> <p><input type="checkbox"/> table(s) related to the sequence listing</p> <p>b. format of material</p> <p><input type="checkbox"/> in written format</p> <p><input type="checkbox"/> in computer readable form</p> <p>c. time of filing/furnishing</p> <p><input type="checkbox"/> contained in the international application as filed.</p> <p><input type="checkbox"/> filed together with the international application in computer readable form.</p> <p><input type="checkbox"/> furnished subsequently to this Authority for the purposes of search.</p>
3.	<p><input type="checkbox"/> In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.</p>
4.	<p>Additional comments:</p>

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Box No. II Priority

1. ☐ The following document has not yet been furnished:

☐ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date in the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

The feature of making an intermediate portion of the optical fibre for transmitting irradiating light a partially circular portion with part thereof curved in a circle, and securing the intersecting portion in the aforementioned partially circular portion by means of a fixing member (see the example of fig. 7) is not described in the earlier application whose priority is claimed; therefore, priority is not established for the inventions set forth in claim 2 and other claims referring thereunto.

The feature of giving an intermediate portion of the optical fibre for transmitting irradiating light a wavelike shape by forming both a partially circular portion curved in a circle and a partially circular portion in the opposite direction (see the example of fig. 8) is not described in the earlier application whose priority is claimed; therefore, priority is not established for the inventions set forth in claim 3 and other claims referring thereunto when an intermediate portion of the optical fibre for transmitting irradiating light is given a wavelike form by forming both a partially circular portion curved in a circle and a partially circular portion in the opposite direction.

The feature of giving an intermediate portion of the

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Box No. II

Priority

optical fibre for transmitting irradiating light a three-dimensional circular shape (including a spiral shape) (see the example of fig. 9) is not described in the earlier application whose priority is claimed; therefore, priority is not established for the inventions set forth in claims 4 and 5 and other claims referring to either of these claims.

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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☐ paid additional fees
  - ☐ paid additional fees under protest
  - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with
  - ☒ not complied with for the following reasons:

The subject matter common to claims 1-15 is "an optical fibre transmitting irradiating light, which is an optical fibre transmitting irradiating light which emits from the emitting end irradiating light which has entered from the incident end, characterized in that at least part of an intermediate portion thereof is curved". However, since the aforementioned common subject matter is well known and does not define a contribution over the prior art, it is not a special technical feature in the sense of the second sentence of PCT Rule 13.2. Thus, there is no special technical feature shared by all of claims 1-15. Claims 1-15 therefore clearly do not satisfy the requirement of unity of invention.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

☒ all parts

☐ the parts relating to claims Nos. \_\_\_\_\_



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INTERNATIONAL SEARCHING AUTHORITY

International application No.

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1, 2, 6, 14, 15	YES
	Claims	3-5, 7-13	NO
Inventive step (IS)	Claims		YES
	Claims	1-15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations:

- Document 1: JP 4-251214 A (CIBA-Geigy AG), 7 September 1992; paragraphs [0015] and [0022] and fig. 1 & EP 435825 A1 & US 5068515 A
- Document 2: JP 5-257029 A (The Whitaker Corp.), 8 October 1993; paragraphs [0006]-[0008], [0029], [0031] and [0032] and fig. 1-5 and 18 & EP 549332 A3 & US 5408551 A
- Document 3: JP 8-179129 A (Asahi Glass Co., Ltd.), 12 July 1996; paragraphs [0014]-[0025] and fig. 1-7 (Family: none)
- Document 4: JP 57-28407 U (Sanyo Electric Co., Ltd.), 15 February 1982; entire text and fig. 1 and 2 (Family: none)
- Document 5: GB 2049985 A (Compagnie Industrielle des Lasers), 31 December 1980; entire text and fig. 1 and 2 & DE 3016370 A & FR 2455300 A
- Document 6: JP 1-124723 A (Otsuka Electronics Co., Ltd.), 17 May 1989; entire text and fig. 1-5 & EP 315967 A2 & US 4922309 A
- Document 7: JP 53-45251 A (Thomson-CSF), 22 April 1978; entire text and fig. 1-4 & US 4184740 A & GB 1588347 A & DE 2744108 A & FR 2366588 A
- Document 8: JP 9-304629 A (Mitsubishi Electric Corp.),

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INTERNATIONAL SEARCHING AUTHORITY

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

28 November 1997; entire text and fig. 1-19

(Family: none)

Document 9: JP 8-122539 A (Nippon Telegraph and Telephone Corp.), 17 May 1996; entire text and fig. 1-4 (Family: none)

Document 10: JP 9-43437 A (Kitagawa Kogyo Co., Ltd.), 14 February 1997; entire text and fig. 1-9 (Family: none)

Document 11: JP 5-303018 A (Sumitomo Electric Industries, Ltd.), 16 November 1993; entire text and fig. 1-13 & EP 531921 A3 & US 5268986 A & KR 9702813 B

Document 12: JP 6-233778 A (Terumo Corp.), 23 August 1994; paragraphs [0013]-[0016] and [0043] and figs. 3, 4 and 7 (Family: none)

Document 13: JP 8-103508 A (Yasuo Hashimoto), 23 April 1996; paragraph [0038] and fig. 1 and 4 (Family: none)

Document 14: JP 2002-202442 A (Fuji Photo Film Co., Ltd.) 19 July 2002; entire text and fig. 1 and 9-11 & US 2002/90172 A1

Document 15: JP 9-127424 A (Yokogawa Electric Corp.), 16 May 1997; entire text and fig. 1 (Family: none)

Claims 3-5 and 7-15

The inventions set forth in claims 3-5 and 7-15 are not novel and do not involve an inventive step, because they are disclosed in documents 1-7 cited in the international search report.

As specifically stated in documents 1-4, techniques of curving optical fibres and similar light transmitting

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

media in order to give a uniform distribution of light intensity across the core cross-section are well known. The optical fibres and similar light transmitting media in documents 5-7 also have curved portions, and said curved portions also clearly have the function of giving a uniform distribution of light intensity across the core cross-section.

In relation to claim 8, connecting an optical fibre bundle of a plurality of optical fibre cores to a large diameter optical fibre or similar light transmitting medium for transmitting irradiating light is known art, as disclosed in document 7 or in documents 12 and 13, cited in the international search report.

In relation to claim 9, enabling adjustment of the curvature of the curved portion in a large diameter optical fibre or similar light transmitting medium for transmitting irradiating light disclosed in any of documents 1-7 in accordance with the intended degree of uniformity of the light intensity distribution is an option available at the discretion of a person skilled in the art.

In relation to claim 10, document 3 (paragraph [0025]) mentions making the diameter of the core of the optical fibre  $1/50$  or less, and more preferably  $1/100$  or less, of the radius of curvature of the optical fibre. Making the radius of curvature in the curved portion of a large diameter optical fibre or similar light transmitting medium for transmitting irradiating light disclosed in any of documents 1-7 at least a given value in order to avoid fracturing the optical fibre on the curved portion and also keeping loss of light below a given value is within the ordinary competence of a person

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

skilled in the art; and as suggested in document 3, specifically making the radius of curvature in the curved portion at least 50 times the diameter of the fibre is within the range of conventional design values.

In relation to claim 11, document 2 (paragraph [0008]) discloses a range of 20 mm to 50 mm for the radius of curvature in large diameter optical fibres or similar light transmitting media for transmitting irradiating light. Making the radius of curvature of the curved portion of a large diameter optical fibre or similar light transmitting medium for transmitting irradiating light disclosed in any of documents 1-7 in order to make the degree of uniformity of the light intensity distribution at least constant is within the ordinary competence of a person skilled in the art; and as disclosed in document 2, a radius of curvature of 75 mm or less is within the range of conventional design values.

The inventions set forth in claims 14 and 15 do not involve an inventive step in the light of documents 1-7. Installing an optical fibre for transmitting irradiating light inside or outside a case are options available at the discretion of a person skilled in the art.

Claims 1 and 2

The inventions set forth in claims 1 and 2 do not involve an inventive step in the light of any of documents 1-7 and any of documents 8-11, cited in the international search report. As disclosed in documents 8-11, etc., when forming given curved portions in an optical fibre employment of fixing members in order to maintain said curved form is well known art. The feature

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Box No. V

Reasoned statement under Rule 43bis.I(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

of securing the intersection in the circular portion by means of a fixing member when the curved shape is circular as described in claim 1, is disclosed in documents 8-11 (see especially the prior example in fig. 19 of document 8). In the case of partially circular shapes as described in claim 2, and especially when there is an intersection with a non-circular portion (straight portion), the feature of securing the intersection by means of a fixing member is disclosed especially in document 10 (the example of fig. 5).

Claim 6

The invention set forth in claim 6 does not involve an inventive step in the light of any of documents 1-7 and documents 12-15, cited in the international search report. Shining irradiating light from a plurality of light sources into an optical fibre for transmitting radiating light, from the incident end, is known art, as disclosed in documents 12-15.